

to control the object (eg: switch the system on or off) and/or communicate with the object.

In an alternate embodiment the number of antenna is increased along with the corresponding equipment to increase the resolution and to provide a more accurate location of the game ball and/or players. As the number of antenna increases the accuracy can be reduced to mere millimeters.

In a still further embodiment of the present invention a laser tracking system can be utilized, wherein the game ball is coated with a material that can be tracked by a laser, thus further eliminating the potential of radio wave interference of the equipment. In a yet further embodiment of the present invention a magnetic field can be generated by the sensor, such as a magnet (passive device), which can be sensed and located, thus increasing the life expectancy of the sensor due to battery life limitations.

The present invention can be used in many applications in and outside of the sporting arena where subjects or objects move within a defined territory, such as an airport or prison environment. The advantages of the invention includes low cost, high accuracy and precise resolution. The foregoing detailed description of the invention has been presented for purposes of illustration and description only. It is not intended to be exhaustive or to limit the invention to the precise form disclosed. Obviously many modifications and variations are possible in light of the above teaching.

What is claimed is:

- (1) A method and system to determine the coarse and fine location of objects in a radiolocation system, through the combined use of direction of arrival of signals at each of several widely spaced reception points,

using closely spaced antennas at each point, with relative phase between the received signals at the widely spaced points.

(2) The implementation of a system as claimed in (1), through the use of the following elements:

- (a) Four or more antennas, arranged in two or more closely spaced pairs dispersed in or around the area to be covered;
- (b) Downconvertors or receivers attached to each of the antennas, with the local oscillators of the downconvertors in all the receivers derived from a single reference;
- (c) Phase locked loops to stabilize and reject noise in the downconverted signals;
- (d) Phase detectors to determine the phase difference between the received signal in each pair of antennas;
- (e) Phase detectors to determine the phase difference between the received signal in antennas not in the same pair.

(3) The application of the radiolocation system in claim 1 or 2, or any other radiolocation scheme, to providing a real time display of ball location or player location in sporting events.

(4) The application of a radiolocation system as in claim 1 or 2, to provide a display of the ball location, player location, or other game piece location, in sporting events, in order to enhance spectators' enjoyment and to aid trainers, players, and officials in accurately determining the ball's location and motion, and/or generation of game statistics.

(5) The application of the radiolocation system in claim 1 or 2, for airport surveillance or for monitoring the entry of airplanes to wrong runways.

(6) The application of the radiolocation system in claim 1 or 2, for childcare facility or prison surveillance.

(7) The application of the radiolocation system in claim 1 or 2, for accurate football game officiating.

(8) The application of the radiolocation system in claim 1 or 2 for golf player club selection assistance.

(9) The application of the radiolocation system in claim 1 or 2 for hockey puck location.

(10) The application of the radiolocation system in claim 1 or 2 for tennis ball location.

(11) The application of the radiolocation system in claim 1 or 2, for baseball game playing, and/or officiating and/or generation of statistics.

(12) The application of the radiolocation system in claim 1 or 2 for viewer enhancement.

(13) The application of the radiolocation system in claim 1 or 2 for monitoring of subjects in an area with defined boundaries.

(14) A system for three dimensional location of objects in a bounded area, the system comprising:

- (a) a sensor, wherein a sensor is coupled to each object to be monitored;
- (b) at least two or more antenna configured to monitor the sensors in a bounded area;
- (b) a receiver for receiving signals from the sensors via the antennas;

(c) a computer with memory operating pursuant to software capable of receiving the signals from the receiver and determining the location of the sensors in the bounded area.

(15) The system according to claim 14, wherein the sensor is capable of transmitting a RF signal.

(16) The system according to claim 14, wherein the sensor is a passive device.

(17) The system according to claim 14, wherein the device is a magnet generating a magnetic field.

(18) The system according to claim 14, wherein the sensor comprises an R-L circuit or an R-C circuit or an R-L-C circuit.

(19) The application of a radiolocation system as claimed in (14), to provide a real time display of the ball location, player location, or other game piece location, in sporting events, in order to enhance spectators' enjoyment and to aid trainers, players, and officials in accurately determining the ball's location and motion.

(20) A system for three dimensional location of objects in a bounded area, the system comprising:

(a) a device capable of being tracked, wherein a device capable of being tracked is coupled to each object to be monitored;

(b) at least two or more antenna configured to monitor the devices in a bounded area;

(c) a receiver for receiving signals from the devices via the antennas;